Tactic- and Speech-Capable Semi-Automated Forces (TACSAF) for Live Virtual Constructive Training

What it is:

- Navy pilot training requires realistic, simulated friendly and enemy forces.
- Today’s semi-automated force (SAF) tools enable one instructor to role-play multiple entities, but SAF applications are labor intensive to operate, and expensive to develop and maintain.
- This effort is developing tools enabling end-users to rapidly author and modify SAF behaviors and to reduce operator workload by automatically adapting SAF behaviors to an individual student’s training needs.

How it works:

- Using Trainable Automated Forces (TAF), end users create new SAF tactics by selecting recorded examples of the tactic from an archive of recorded exercises.
- New tactics are automatically integrated within behavior models that are aware and responsive to the tactical and pedagogical situation.
- A Training Executive Agent (TXA) monitors student performance and modulates SAF enemy and friendly behavior to present appropriate levels of challenge.

What it will achieve:

- Cost savings in all phases of SAF construction, operation, and maintenance
- Increased realism for simulated friendly and enemy forces
- Tailored experience for students of various skill levels and in support of varied pedagogical objectives
Overview

Many approaches to SAFs employ behavior models that require specialized personnel in one or more development phases:

- Behavior Engineering and Scenario Scripting
- Training Operations, Maintenance, and Upgrades

This process is costly, and does not efficiently adapt over time to the needs of end-users, new platforms, or changes in tactics, techniques, and procedures (TTPs). Specialized personnel requirements result in high support costs over the life-cycle of the product.

The Trainable Automated Forces (TAF) offers a software solution enabling the Navy to overcome deficiencies in the Constructive component of Live Virtual Constructive simulation training. The TAF approach takes recorded expert performance and uses machine learning techniques to derive behavior models for simulated entities. Users will define TAF behaviors using a new tool, the TAF Sandbox. The first step is to train TAF with individual skills. The user selects examples from recordings of past LVC exercises in which constructive entities were manually controlled in the Next Generation Threat System (NGTS). Then, machine learning algorithms derive a statistical model of the observed behaviors, including responses conditioned on the dynamic environment. Errors in TAF behavior can be remedied by re-training with additional examples, or by specifying rules to constrain TAF-generated behaviors (e.g., the Rules of Engagement).

Increasing the instructional effectiveness of SAFs can also reduce costs. The Training Executive Agent (TXA) is a software agent that acts as a virtual operator facilitator. It reasons and acts in accordance with the learning context. The TXA creates a dynamic assessment of student action within the scenario and estimates learner proficiency. When appropriate, the TXA will recommend a change to an individual TACSAF entity’s behavior in order to achieve or enhance pedagogical goals. The TXA is founded on dynamic tailoring and command agent technologies, which are used as “pedagogical directors” for simulation-based training applications.

These new technologies will be integrated into the Next Generation Threat System (NGTS).